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Contact Lens Knowledge of Complications and Practice among University of Tabuk Medical Students

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Abstract **Background:** There are approximately 140 million contact lens (CL) users globally, which is ever-increasing. Studies on the knowledge and risk factors of CL are scarce. **Objectives:** Thus, in this study, we aim to assess the attitude and awareness of CL use and the associated risk factors among Tabuk University, Saudi Arabia, medical students. **Methods:** This is across-sectional study that was developed based on a designed questionnaire to test the knowledge and risk factors of contact lenses. The questionnaire was composed of 33questions with a maximum score of 28 points. The study was conducted among 329 students of the University of Tabuk during the period from March to September 2024. **Results:** A total of 329 participants were included in this study; the majority were females (66.7%), aged 19-21 years and 40.4% were from the College of Medicine. Contact lens knowledge and attitude were poor among students at the University of Tabuk, Saudi Arabia, 5.05±2.38/28 and 12.74±5.13/28, respectively, poor knowledge was observed in 22.5% and poor attitude in 92.1%. Females 'knowledge and attitude were better among females compared to males, 95% CI 1.335-5.612 and p-value, 0.006 No differences were found regarding age, class and college, p-value >0.05. **Conclusion:** Contact lens knowledge was suboptimal among students in the University of Tabuk, Saudi Arabia. Female participants had higher total mean knowledges cores than males. Increasing the awareness about CLs and the implementation of mandatory CL education workshops are highly needed. Larger multicenter studies among the general population are recommended.

Key Words Contactlenses, knowledge, Complications, Saudi Medical Students, Contact Lens Hygiene

INTRODUCTION

Contact Lens (CLs) are approved for use for corneal problems and refractive error in particular in the young population [1]. The use of contact lens is on the rise for both cosmetic reasons and medical error [2,3]. Contact lens were shown to improve the quality of life because of the increased flexibility of CLs and enhanced appearance compared to wearing glasses [4,5].

The prevalence of contact lens usage for managing refractive errors and for cosmetic enhancement has seen a marked increase, imposing significant challenges on both affected patients and the healthcare systems [1]. Contact Lenses (CLs) have long been recognized as an effective solution for correcting refractive errors, earning broad acceptance and approval from healthcare professionals and regulatory bodies.

The primary aim of using Cs is often medical, as they rectify various forms of refractive anomalies and address specific corneal pathologies. However, there is also a substantial cosmetic dimension to their use, as many individuals turn to contact lenses to enhance their appearance by providing an alternative to traditional eye glasses. Over the years, the prescription of CLs has become more common, with a notable upward trend in their adoption, indicating a growing preference for this form of vision correction [2,3].

A wealth of literature has documented the numerous advantages associated with the use of contact lenses. Research has shown that the overall quality of life (QoL) for individuals who wear CLs has improved significantly, with younger patients particularly benefiting from this change. Several factors contribute to this enhancement in QoL, including the increased flexibility of contact lenses, which allows for a wider range of activities without the constraints often posed by spectacles. Additionally, the aesthetic appeal of CLs can boost self-esteem and confidence, which further enhances the user's overall satisfaction and daily experiences [4,5].

In summary, the rising adoption of contact lenses-be it for medical correction, corneal treatment or cosmetic purposes—reflects a significant shift in how individuals approach vision correction. As usage increases, it is essential to consider both the benefits and the accompanying challenges that affect patient wellbeing and healthcare resources.

Studies have shown that as a result of the increasing frequency of wearing CLs, many associated problems have been reported [6]. Many complications can develop following the frequent and improper wear of CLs. Endophthalmitis and keratitis are common serious complications that many CL users are not aware of. The development of such complications might lead to the development of serious adverse events which may impact the affected users' vision as a result of the poor compliance to the prescribed guidelines by the attending physicians [7,8]. A study conducted in Saudi Arabia found keratitis in 30% of contact lens users [9]. Risk of developing ocular infections as a result of at least one mispractice related to CLs care [10]. Previuos studies also reported that the continuous use of CLs has resulted in increasing the frequency of itching, burning or tearing eyes. Besides, other complications as conjunctival hyperemia might develop which may cause discomfort and affect the care provided by wearing CLs [11,12]. Therefore, it is essential to raise awareness and knowledge about CLs' use and care to avoid such complications and attain the potential best benefits from wearing them.

Despite the advantages of contact lens. However, serious complications including endophthalmitis and keratitis that could substantially impair vision. The excessive and improper use are the main culprits. Importantly, the users are not aware about these serious complications. Therefore, raising the awareness about the guidelines by eye care professionals is important [7,8].

Al Hadlaq *et al.* [9] published a study in the United States and found that the majority of contact lens wearers are at a risk of ocular infections due to improper care. While, Yee *et al.* [10] found tearing of the eyes, blurring of vision and itching due to prolonged contact lens use. In addition, discomfort from conjunctival hyperemia could lead to discomfort and diminishing the overall experience of wearing contact lenses [11,12].

In light of the seen concerns, it is imperative to improve awareness and education regarding the proper use and maintenance of contact lenses. By equipping users with the necessary knowledge about best practices, the potential for complications can be reduced, thereby enhancing the benefits of contact lens wear while safeguarding ocular health.

A study published in Pakistan reported poor knowledge of contact lens among healthcare practitioners using CLs [13]. The prevalence of contact lens was 70.2% in the Kingdom of Saudi Arabia and nearly two-thirds used them for cosmetic reasons and 39% of females did not informed their doctors before [14].

To obtain a thorough understanding of individuals' awareness and knowledge regarding Contact Lens (CL) usage and care, itis vital to conduct extensive epidemiological studies in diverse regions. In Pakistan, research has revealed a concerning lack of awareness about proper CL care, with more than half of the healthcare practitioners [13] who use contact lenses lacking sufficient knowledge on the subject.

In Saudi Arabia, a study by Abahussin *et al.* [14] reported a contact lens usage prevalence of 70.2%, with about two-thirds of users opting for them primarily for cosmetic reasons. Another study conducted in the Eastern Province of Saudi Arabia reported a prevalence of 16% in females [15]. Notably, the same study found that nearly 39% of female students reported using contact lenses without consulting a healthcare professional beforehand. These findings highlight the pressing necessity for focused educational programs aimed at enhancing awareness and understanding of safe contact lens practices, not only for healthcare practitioners but also for users in general.

Contact lens use is associated with severe complications in Saudi Arabia including dry eye, keratitis and allergic reactions because the majority were using contact lens during sleeping [16].

However, not many studies have investigated these outcomes among medical students.

We hypothesized females would have better CL knowledge than males. Thus, in this study, we aim to assess the attitude and awareness of CLs use and the associated factors among medical students of Tabuk University, Saudi Arabia as primary objective and to assess the factors that influence these views including gender differences as secondary objective.

METHODS

Study Design and Population

This is across-sectional study that developed based on a designed questionnaire to estimate the level of knowledge and awareness towards contact lenses use among medical students in Tabuk University, Saudi Arabia during the period from March to September 2024. We also aimed to assess the variation in the level of knowledge and awareness between males and females and explore the possible important factors that may affect the level of knowledge and awareness about contact lenses care. All of the study participants were medical students only and have agreed to take part in this study and the institutional review board approval was obtained from the Tabuk University (UT-345-182-2024). The STROBE guidelines for observational studies were strictly followed.

Sampling

We adopted random sampling technique to recrute the participants. Our questionnaire was composed of three main parts and an introductory part to explain to the participants the background of the study and the aimed outcomes. The first main part included 16 questions that were mainly about the use of CLs including the duration of use, the reasons, types and mode of wear, in addition to the baseline characteristics and demographics. The second and third main parts consisted of 18questions that would help evaluate the knowledge about CLs use and wear, like hand washing before using CLs, cleaning CLs, cleaning materials,

knowledge about renewal, wearing practices, knowledge about over wear syndrome and associated symptoms and complications and how to behave when noticing a CL-related symptom. The maximum score was calculated out of 28 points for the knowledge and risk factors components. Those who scored ≥70% were regarded as having good knowledge. Regarding the coding of the obtained answers of the study participants, any question that was answered by a yes or no, the answer was coded as 1 or 0, respectively. Any question that was composed of three sections (yes, no, sometimes), the answer was coded as 2, 0, 1, respectively. Moreover, scaled questions were coded based on the number of each factor, as each one represented one score and never or no represented 0 scores.

Measures

A structured web-based questionnaire was used for data collection, the internet is freely provided in the University of Tabuk, Saudi Arabia and a paper option of questionnaire was also available). The second and third researchers were available for any difficulty in filling the questionnaire. The questionnaire was composed of three components, the first reported the age, gender, college, class, duration and type of contact lens, the reason behind wearing of contact lens, the second part was about contact lens knowledge including mode of washing contact lens and if using contact lens beyond expiration or sharing with other, contact lens complications and action when complications happen. The third section inquire about contact lens risk factors including wearing during sleeping, swimming and exercise, wearing lens without hand washing, washing contact lens with water and contact lens complications including eye redness, itching, infection, blurring of vision, blindness and corneal scar. The questionnaire was piloted and approved by a Biostatistician, Internist and Ophthalmologist. The cut-off of the good knowledge of 70% was taken from previous similar studies in Saudi Arabia.

Ethical Issues

All the participants consent was taken before responding to the questionnaire. The collected data were kept anonymous (with ID codes) with a password by the principal investigator. The study was approved by the Tabuk University ethical committee Saudi Arabia. Number (UT-345-182-2024).

Statistical analysis

The statistical Package for Social Sciences (IBM, SPSS, Version 20, New York) was used for data analysis which were presented as Mean±SD and percentages, the Binary Logistic Regression Analysis was used to assess the association of the students' knowledge. Regarding contact lens with age, gender, class, college and risk factors. A p-value of <0.05 was considered significant.

RESULTS

They were 329 medical students (219women), their ages were 16-18 in 24%, 19-21 in 47.1% and 22-24 in 28.9%, 40.4% were from the medical college, 21.3% from Science, 12.5% from engineering and 5.5% were from business, 14.9% were from the first class, 19.8% were in the second class, 28.3% were in the third class,14.9% were from the fourth class, while 10% and 12.2% were from the fifth and sixth classes respectively (Table 1, Figure 1).

Table 1: Sociodemographic of students in University of Tabuk, Saudi Arabia

Character	No (%)
Age groups/years	
16-18	97 (24%)
19-21	155 (47.1%)
22-24	95 (28.9%)
College	
Business	18 (5.5%)
Engineering	41 (12.5%)
Medicine	133 (40.4%)
Science	70 (21.3%)
Other	67 (20.3%)
Class	
First class	49 (14.9%)
Second class	65 (19.8%)
Third class	93 (28.3%)
Fourth class	49 (14.9%)
Fifth class	33 (10.0%)
Six class	40 (12.1%)

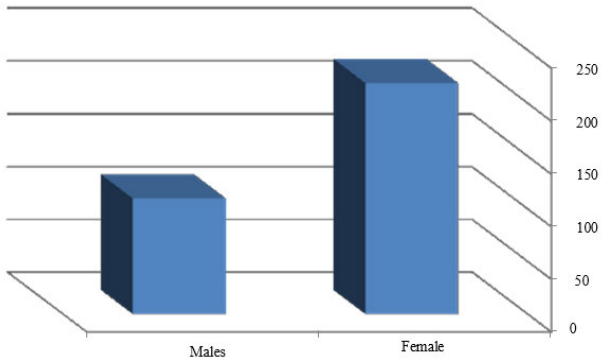

Figure 1: Gender in medical students in the University of Tabuk, Saudi Arabia

In the present study, 94.2% of students used soft contact lens and for short time (60.5%), regarding duration of wearing for the extend type, it was one month in 22%, 2-8 months in 54.7% and one year in 23.3%. Other characteristics of students who used contact lens was illustrated in Table 2.

Regarding the knowledge about contact lens, 68.7% used the especial solution to wash their contact lens and one in five (20.4%) used the lens beyond expiry date. Knowledge about side effect of eye makeup use was poor (41.6%), 84.2% will remove the contact lens immediately in case of any problem, 39.8% used contact lens for beauty and 34.3% were aware about ever wear syndrome. The knowledge about contact lens was poor (22.5% had good knowledge) (Table 3).

In the present study, 11.6% of students used to wear their contact lens during sleeping and 11.9% sometimes did so, 6.7% wear lens during swimming and 11.9%wear them sometimes, only aminority (3.3%) share lens with others, while, 16.4% used to do, wearing lens without hand washing was observed in 17.6% and sometimes in 15.5%. regarding the contact lens washing, 73.9% used the special solution,

Table 2: Characteristics of contact lens usage among male and female

Character	No (%)
Are you acontact lens wearer?	
Yes	265 (80.5%)
No	64 (19.5%)
Duration of contact lens	
Long	130 (39.5%)
Short	199 (60.5%)
Type of contact lens	
Soft	310 (94.2%)
Hard	19 (5.8%)
Mode of wearing	
Extended	179 (54.4%)
Daily	150 (45.6%)
Duration of wearing for the extend type	
One month	65 (22%)
2-8 months	162 (54.7%)
One year	69 (23.3%)
How frequently use contact lens	
Daily	137 (41.6%)
Frequently	192 (58.4%)
Hours per day wearing contact lens	
>12 months	108 (32.8%)
8-12 months	63 (19.2%)
<8 months	158 (48%)
Cosmetic	191 (58.1%)
For refractive error	138 (41.9%)

Table 3: Contact lens knowledge among Tabuk University students

Character	No (%)
Wash with especial solution	
Yes	202 (61.4%)
No	103 (31.3%)
Sometimes	24 (7.3%)
Do you use beyond the expiry date?	
Yes	29 (8.8%)
No	262 (79.6%)
Sometimes	38 (11.6%)
Knowledge about side effect of eye makeup use	
Yes	137 (41.6%)
No	192 (58.4%)
What you will do in case if you have been exposed to one of the eye problem due to Wearing acontact lens?	
Remove the lens immediately	277 (84.2%)
Keeping the contact lens and going to Eye physician	52 (15.8%)
Why do you think using contact lens is increasing nowadays	
Beauty	131 (39.8%)
Cheaper	38 (11.6%)
Easy to buy	87 (24.6%)
Safer	30 (9.1%)
Better quality/more safe	43 (13.1%)
Knowledge about ever wear syndrome (Ocular pain bycorneal epithelium damage, conjunctival injection, lacrimation, photophobia and hazyvision following corneal edema caused by over wear of contact lenses)	
Yes	113 (34.3%)
No	216 (65.9%)
Overall contact lens knowledge	
Good	74 (22.5%)
Poor	255 (77.5%)
Total score (Mean±SD out of 28)	5.05±2.38

and 36.4% washed them with water. Interestingly, only 66.3% thought that contact lens cause eye redness, 52.9% thought that wearing contact lens cause eye itching, 41.3, 39.8, 25.2 and 24.3% thought that wearing contact lens cause microbial infection to eye, blurring of vision, blindness and corneal scar respectively.

Table 4: Contact lens attitude and practice (Risk Factors)

Do you wear lens during sleeping	
Yes	38 (11.6%)
No	252 (76.6%)
Sometimes	39 (11.8%)
Do you wear lens during swimming	
Yes	22 (6.6%)
No	268 (81.5%)
Sometimes	39 (11.9%)
Do you wear lens during exercise	
Yes	42 (12.8%)
No	225 (68.4%)
Sometimes	62 (18.8%)
Sharing lens with others	
Yes	11 (3.4%)
No	264 (80.2%)
Sometimes	54 (16.4%)
Wearing lens without hand washing	
Yes	58 (17.6%)
No	220 (66.9%)
Sometimes	51 (15.5%)
Washing lens with water	
Yes	86 (26.1%)
No	209 (63.6%)
Sometimes	34 (10.3%)
Washing lens with special solution for contact lens	
Yes	221 (67.2%)
No	86 (26.1%)
Sometimes	22 (6.7%)
Do you know wearing contact lens cause eye redness	
Yes	218 (66.3%)
No	62 (18.8%)
Sometimes	49 (14.9%)
Do you know wearing contact lens cause eye itching	
Yes	174 (52.9%)
No	96 (29.2%)
Sometimes	59 (17.9%)
Do you know wearing contact lens cause Infection to eye (danger)	
Yes	136 (41.3%)
No	153 (46.5%)
Sometimes	40 (12.2%)
Do you know wearing contactl ens cause blurring of vision	
Yes	131 (39.8%)
No	147 (44.7%)
Sometimes	51 (15.5%)
Do you know wearing contact lens cause blindness	
Yes	83 (25.2%)
No	210 (63.8%)
Sometimes	36 (11.%)
Do you know wearing contact lens cause corneal scar	
Yes	80 (24.3%)
No	231 (70.2%)
Sometimes	18 (5.5%)
Contact lens overall attitude and practice	
Good	26 (7.9%)
Poor	303 (92.1%)
Total score (mean± SD out of 28)	12.74±5.13

Importantly the overall attitude regarding contact lens was poor (92.1% scored less than 70%) (Table 4). Regarding the knowledge about contact lens, female knowledge was better than males, B, 1.007, 95% C.I. for EXP(B), 1.335-5.612 and P-value, 0.006, no differences were evident regarding age (EXP(B), 0.525-6.374 and p-value, 0.343),

Table 5: The association of contact lens knowledge among Tabuk University students with age, gender, college, class and risk factors

Character	B	Exp (B)	95% C.I. for EXP (B)	p-value
Age	0.604	1.829	0.525-6.374	0.343
Gender	1.007	2.737	1.335-5.612	0.006
College	0.318	1.374	0.629-3.001	0.425
Class	-0.556-	0.574	0.151-2.181	0.415
Risk factors	-1.594-	0.203	0.084-0.492	<0.001

college, (EXP(B), 0.629-3.001 and p-value, 0.425) and class (EXP(B), 0.151-2.181 and p-value, 0.415) (Table 5).

DISCUSSION

In this study, 80.5% of college students at the University of Tabuk, Saudi Arabia used contact lens, 60.5% of students use was short-term only, our findings were similar to a study conducted 9n Jazan, Saudi Arabia in which 66.8% were using contact lens monthly or auually [16]. The rate of contact lens use in this study was higher than a prevalence reported in the University of Bisha, Saudi Arabia who observed that 43.8% of females use contact lens [17]. The prevalence of contact lens varied significantly by geographical region and ranged from 17.1 to 80.5%.

Our findings also showed that the mean total knowledge score was 5.05±2.38 out of the total of 28 and the majority were females. The present findings were lower than studies conducted in Bisha and Jazan who found good knowledge in 39.9-64.2% and 67.5-74.6% in University students depending on age, class and region [16,18]. Female students had better knowledge compared to their males counterparts. A plausible explanation could be the high prevalence of CLs among them, which subjects them to obtain more information about the use and care of CLs [19].

Previous studies have indicated that various factors are linked to the development of complications associated with contact lens (CL) use. Bamahfouz *et al.* [20] found that prolonged daily use, as well as wearing contact lenses while sleeping (11.6%), showering or swimming (6.8%), was significantly related to the onset of such complications. In our study, we observed that daily CL usage and the tendency to wear them continuously, 11.6% of students used contact lens during sleeping, 6.6% used them during swimming. However, hand washing before wearing contact lens was higher (93.6%) compared to our findings in which 66.9% used to wash their hands before wearing contact lens.

Furthermore, inadequate hygiene practices, such as not washing hands before handling CLs, improper cleaning methods and insufficient rubbing techniques, are significant factors that could elevate the risk of complications [21]. In our research, most participants reported washing their hands before putting on their contact lenses but around two-thirds did not utilize rubbing techniques for cleaning. Importantly, these hygiene practices were more frequently observed among female participants, highlighting a knowledge gap in proper contact lens care with in the Saudi population. This underscores the urgent need for targeted educational initiatives to enhance awareness about safe contact lens practices.

A study conducted by Thakur *et al.* [22] reported that approximately half of the participants who used contact lenses exhibited detectable bacterial contamination in their lens care solutions and/or on their lenses, although none of these individuals developed symptoms at the time. These findings further emphasize the necessity of improving contact lens hygiene practices to minimize potential complications.

In this study, 61 and 7.3% of the students use the especial solution for washing contact lens, 79.6% did not wear contact lens beyond the expiration date, 84.2% will remove contact lens immediately if they develop eye problem. Our findings were similar to Albasheer *et al.* [18] who found that contact lens users used the especial solution in 74.7% of cases, did not use contact beyond expiration (56.3% for always and 19.7% for usualy) and 71.4% will remove the contact lens immediately in case of developing eye problem.

We also conducted a binary regression analysis to identify factors that predict higher knowledge scores related to contact lens (CL) use. Our findings indicated that being a female contact lens users significantly correlates with achieving higher knowledge scores [23,24]. This association is understandable, as individuals who frequently wear contact lenses are likely to seek more information to optimize their cosmetic and medical outcomes. Additionally, we observed that third-year medical students also had significantly higher knowledge scores compared to both younger and older participants. While we do not have a definitive explanation for this correlation, it may stem from demographic differences among the participants. Previous studies have highlighted the role of education in enhancing knowledge scores.

Conversely, Alzahrani *et al.* [23] found that in a general Saudi population, neither gender nor educational level significantly correlated with higher knowledge scores regarding contact lens use, although participants younger than 25 years demonstrated such a correlation. Furthermore, a registry-based study reported that male contact lens users exhibited fewer symptoms compared to females. The researchers posited that this could be attributed to female participants being more likely to promptly report symptoms and seek attention from healthcare professionals. Notably, that same study observed higher adherence to hygienic practices related to contact lens use among female participants [24]. This suggests that women generally possess more knowledge about the care and use of contact lenses than men.

Given that contact lenses are incorporated into the daily routines of many individuals, proper hygienic practices are essential to prevent infections and other complications. This study represents the first effort to investigate knowledge and practices regarding contact lenses in Tabuk, Saudi Arabia. Future research involving larger and more diverse populations is needed to further explore these issues.

Several factors may have constrained the findings of this stud. First, the cross-sectional design may have introduced biases related to self-reporting, which can affect the accuracy of the data collected. Single-center study limits generalizability to other Saudi regions, disease severity spectrum missing, comorbidity data were not included despite potential impact on CL practices and cultural variability not addressed. Additionally, the limited sample size may not adequately represent the broader population, highlighting the need for further research with a more robust sampling strategy and an improved study design to validate and expand upon these results. Other major limitations are the gender imbalance, non-stratification by clinical exposure and the non-medical colleges severely underrepresented.

CONCLUSIONS

Contact lens knowledge and attitude are suboptimal among students in the University of Tabuk, Saudi Arabia. Women had higher knowledge than their male's counterparts. Increasing the awareness about CLs is highly needed. Curriculum modifications for medical training programs to raise the awareness about the contact lens, campaigns implementation by the students scientific groups and extra-curricular activities during summer are recommended. Involving university health services in the community awareness is suggested. Multi-center Saudi studies across different regions with longitudinal tracking of CL complication rates, inclusion of non-medical students for broader perspectiv, qualitative follow-up (interviews) to explore cultural influences and Intervention studies testing CL education programs are highly needed.

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